

REMARKS

Claims 1-26 were originally filed in the present application. Claims 27-32 were subsequently added, and claims 1-10 and 19 were canceled without prejudice or disclaimer. Currently, claims 16 and 24 are canceled without prejudice or disclaimer, and no claims are added. Consequently, claims 11-15, 17, 18, 20-23 and 25-32 are currently pending in the present application.

Reconsideration of the present application in light of the above amendments and the following remarks is respectfully requested.

Rejections under 35 U.S.C. §102

Claim 11

Claim 11 recites:

11. A magnetic memory cell comprising a switching element and a magnetic tunnel junction (MTJ) configuration comprising:
a first MTJ device including a first free layer, a first tunneling barrier, and a first pinned layer;
a second MTJ device including a second free layer, a second tunneling barrier, and a second pinned layer, wherein the second tunneling barrier is comprised of a different material than the first tunneling barrier; and
a first conductor connecting the first and second MTJ devices;
wherein a first magneto-resistance of the first MTJ device is different in magnitude relative to a second magneto-resistance of the second MTJ device.

Claim 11 was rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,930,164 to Zhu ("Zhu").

The PTO provides in MPEP §2131 that:

“[t]o anticipate a claim, the reference must teach every element of the claim....”

Therefore, to sustain this rejection with respect to claim 11, Zhu must contain all of the above claimed elements of the claim. However, in the context of claim 11, Zhu does not disclose that the second tunneling barrier is comprised of a different material than the first tunneling barrier, among other elements recited in claim 11.

Nonetheless, pointing to Zhu at column 1, line 66 through column 2, line 2, the Examiner asserts that “Zhu discloses the memory cell of claim 11 wherein the first tunneling barrier (113) is comprised of a different material than the second tunneling barrier (123).” (Examiner’s Office Action, page 4, lines 8-10). This portion of Zhu provides: “Two barrier layers in the memory cells have different thicknesses which produce a different magnetic resistance over the MRAM unit according to states stored in the memory cells.” Clearly, this portion of Zhu which is cited by the Examiner fails to disclose that the first and second tunneling barriers are comprised of different materials, as required by claim 11. In contrast, this cited portion of Zhu merely provides that the barrier layers have different thicknesses – not different materials. Moreover, the remainder of Zhu also fails to disclose first and second tunneling barrier layers of different materials.

Accordingly, the §102 rejection of claim 11 is not supported by Zhu. Consequently, Applicants respectfully request the Examiner withdraw the rejection.

Claim 18

Claim 18 recites:

18. An integrated circuit comprising:
an input/output section;
a plurality of logic circuits connected to the input/output
section; and

a plurality of magnetic memory cells connected to the logic circuits, the magnetic memory cells including a transistor and a storage structure including:

- a first magnetic junction device including a first free layer, a first tunneling barrier, and a first pinned layer;
- a second magnetic junction device including a second free layer, a second tunneling barrier, and a second pinned layer, wherein the second tunneling barrier is comprised of a different material than the first tunneling barrier; and
- a first conductor connected to configure the first and second magnetic junction devices in parallel;

wherein a first magneto-resistance ratio of the first magnetic junction device is different in magnitude relative to a second magneto-resistance ratio of the second magnetic junction device.

Claim 18 was also rejected under 35 U.S.C. §102(b) as being anticipated by Zhu. Therefore, as described above, to sustain this rejection, Zhu must contain all of the above claimed elements of the claim. However, as also described above, Zhu does not disclose that the second tunneling barrier is comprised of a different material than the first tunneling barrier, among other elements recited in claim 18.

Accordingly, the §102 rejection of claim 18 is not supported by Zhu. Consequently, Applicants respectfully request the Examiner withdraw the rejection.

Claim 27

Claim 27 recites:

27. An apparatus, comprising:

- a first magnetic tunnel junction having a first magneto-resistance ratio of 50-60%; and
- a second magnetic tunnel junction having a second magneto-resistance ratio of 20-30%, wherein:
 - the first and second magnetic tunnel junctions are electrically connected.

Claim 27 was also rejected under 35 U.S.C. §102(b) as being anticipated by Zhu. Therefore, as described above, to sustain this rejection, Zhu must contain all of the above claimed elements of the claim. However, in the context of claim 27, Zhu does not disclose a first magneto-resistance ratio of 50-60% and a second magneto-resistance ratio of 20-30%, among other elements recited in claim 27.

Nonetheless, pointing to Zhu at column 2, lines 50-51 and 60-61, the Examiner asserts that Zhu discloses where “the first magneto-resistance ratio of the first tunneling barrier (113) is 50-60% (Zhu discloses a first barrier (113) has a thickness of 22-30 Angstroms) and the second magneto-resistance ratio of the second tunneling barrier (123) is 20-30% (Zhu discloses a second barrier (123) has a thickness of 15-22 Angstroms) (... similar to 50% different ratio between first and second magneto-resistance).” (Examiner’s Office Action, page 5, line 19 through page 6, line 3).

The portion of Zhu which Applicant believes the Examiner intended to cite provides:

- “Barrier layer 113 is made of Al_2O_3 and has a thickness of 22-30 Angstrom.”
- and
- “Second barrier layer 113 has a thickness of 15-22 Angstrom.”

However, these portions of Zhu do not disclose a first magneto-resistance ratio of 50-60% and a second magneto-resistance ratio of 20-30%. They merely teach the thicknesses of the barrier layers 113 and 123, and that the thicknesses may vary relative to each other by 65-75%. As described above, for a reference to anticipate a claim, MPEP §2131 requires that the reference must teach every element of the claim. Mere similarity is insufficient to establish anticipation.

Moreover, the fact that Zhu teaches the possible thicknesses of the barrier layers 113 and 123 falls well short of additionally teaching a first magneto-resistance ratio of 50-60% and a second magneto-resistance ratio of 20-30%. For example, Zhu does not disclose that there is a direct numerical correlation between barrier layer thickness and magneto-resistance ratio. That

is, Zhu does not teach that constructing the barrier layer 113 with a thickness of 22-30 Angstroms will yield a magneto-resistance ratio of 50-60%. Zhu also fails to teach that constructing the barrier layer 123 with a thickness of 15-22 Angstroms will yield a magneto-resistance ratio of 20-30%. Thus, Zhu fails to teach each and every element recited in claim 27 of the present application.

Accordingly, the §102 rejection of claim 27 is not supported by Zhu. Consequently, Applicants respectfully request the Examiner withdraw the rejection.

Rejections Under 35 U.S.C. §103

Several dependent claims were also rejected under 35 U.S.C. §103 as being unpatentable over Zhu in view of one or more other references of record. However, none of these references overcome the above-described shortcomings of Zhu. Consequently, any such combination of references cited by the Examiner is defective in establishing a *prima facie* case of obviousness with respect to any of the claims discussed above and, thus, their dependent claims. Accordingly, Applicants respectfully request the Examiner withdraw such rejections.

Conclusion

All matters set forth in the Office Action have been addressed. Accordingly, it is believed that all claims are in condition for allowance. Favorable consideration and an early indication of allowability are respectfully requested.

Should the Examiner deem that an interview with Applicants' undersigned attorney would expedite consideration, the Examiner is invited to call the undersigned attorney at the telephone number indicated below.

Respectfully submitted,



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